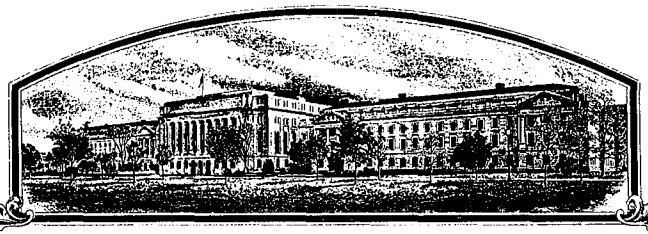
No. 9000249



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Pioneer Hi-Bred International, Inc.

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF *eighteen* YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

CORN

'PHN46'

In Testimony Whereof, *I have hereunto set my hand and caused the seal of the* Plant Variety Protection Office *to be affixed at the City of* Washington, D.C. *this* 29th *day of* November *in the year of our Lord one thousand nine hundred and* ninety-one.

Attest:

Kenneth A. Evans

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Ed Madigan

Secretary of Agriculture

FORM APPROVED: OMB 0581-0055, Expires 1/31/91

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

Application is required in orde determine if a plant variety prote certificate is to be issued (7 U.S.C. Information is held confidential certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) *(as it is to appear on the Certificate)*
Pioneer Hi-Bred International, Inc.

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NO.

3. VARIETY NAME
PHN46

4. ADDRESS *(street and no. or R.F.D. no., city, state, and ZIP)*
Plant Breeding Division
Department of Corn Breeding
PO Box 85
Johnston, IA 50131-0085

5. PHONE *(Include area code)*
515/270-3300

FOR OFFICIAL USE ONLY

PVPO NUMBER
9000249

FILING
Date: August 28, 1990
Time: ☐ A.M. ☐

FEES RECEIVED
Filing and Examination Fee: $ 2150.00
Date: August 28, 1990
Certificate Fee: $ 250
Date: November 6, 1990

6. GENUS AND SPECIES NAME
Zea mays

7. FAMILY NAME *(Botanical)*
Gramineae

8. CROP KIND NAME *(Common Name)*
Corn

9. DATE OF DETERMINATION
Oct. 1988 JMS 7/9/91

10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION *(Corporation, partnership, association, etc.)*
Corporation

11. IF INCORPORATED, GIVE STATE OF INCORPORATION
Iowa

12. DATE OF INCORPORATION
May 6, 1926

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS
Dr. Bruce D. McBratney
Plant Breeding Division
Pioneer Hi-Bred International, Inc.
PO Box 85
Johnston, IA 50131-0085
PHONE *(Include area code)*: 515/270-3546

14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED *(Follow INSTRUCTIONS on reverse)*

a. ☒ Exhibit A, Origin and Breeding History of the Variety.
b. ☒ Exhibit B, Novelty Statement.
c. ☒ Exhibit C, Objective Description of Variety.
d. ☒ Exhibit D, Additional Description of Variety.
e. ☒ Exhibit E, Statement of the Basis of Applicant's Ownership.
f. ☒ Seed Sample (2,500 viable untreated seeds). Date Seed Sample mailed to Plant Variety Protection Office August 24, 1990
g. ☒ Filing and Examination Fee ($2,150) made payable to "Treasurer of the United States."

15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? *(See section 83(a) of the Plant Variety Protection Act.)*
☐ YES *(If "YES," answer items 16 and 17 below)* ☒ NO *(If "NO," skip to item 18 below)*

16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?
☐ YES ☐ NO

17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?
☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED

18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.?
☐ YES *(If "YES," through* ☐ Plant Variety Protection Act ☐ Patent Act. Give date: _____ .)
☒ NO

19. HAS THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?
☐ YES (If "YES," give names of countries and dates)
☒ NO

20. **The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.**

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in section 41, and is entitled to protection under the provisions of section 42 of the Plant Variety Protection Act.

Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT *(Owner(s))*	CAPACITY OR TITLE	DATE
Pioneer Hi-Bred International, Inc.		
Bruce D. McBratney	Technical Support Coordinator	8/15/90

14A. Exhibit A. Origin and Breeding History

Pedigree: PHZ51/PHV78)X1113X

Pioneer Line PHN46, Zea mays L., a yellow dent corn inbred, was developed by Pioneer Hi-Bred International, Inc. from the single cross PHZ51 x PHV78 using the pedigree method of breeding. The progenitors of PHN46 are proprietary inbred lines of Pioneer Hi-Bred International, Inc. Selfing and selection were practiced within the above F1 cross for six generations in the development of PHN46 at Princeton, Illinois. During line development, crosses were made to inbred testers for the purpose of estimating the line's combining ability. Yield trials were grown at Princeton, Illinois, as well as other Pioneer research stations in the mid-maturity areas of the United States Corn Belt. After initial testing, additional hybrid combinations have been evaluated and subsequent generations of the line have been grown and hand-pollinated with observations made for uniformity.

PHN46 has shown uniformity and stability for all traits as described in Exhibit C - "Objective Description of Variety". It has been self-pollinated and ear-rowed a sufficient number of generations with careful attention paid to uniformity of plant type to assure genetic homozygousity and phenotypic stability. The line has been increased both by hand and in isolated fields with continued observations for uniformity.

No variant traits have been observed or are expected in PHN46.

Developmental History for PHN46

Season/Year	Inbreeding Level
Summer 1984	F0 (Cross made)
Winter 1985	F1
Summer 1985	F2
Winter 1986	F3
Summer 1986	F4
Winter 1987	F5
Summer 1987	F6
Winter 1988	F7*
Summer 1988	F8
Winter 1989	F9
Summer 1989	F10**

* PHN46 was selfed and selected through F7 generation.

** PHN46 was selfed and ear-rowed from F8 through F10 generations.

Exhibit A: During the early development (F1-F2) of the inbreds, selection was based on agronomic characteristics (e.g., plant height, stalk lodging, disease and insect resistance, etc.) whereas, from F3 through later generations selection was based on yield as well as agronomic characteristics. The most important traits during selection would be those described in the definitions section and in Exhibit D. Yield is looked at on a per se basis and how well an inbred performs in hybrid combination.

14B. Exhibit B. Novelty Statement

PHN46 is most similar to the Pioneer Hi-Bred International, Inc. proprietary inbred line PHZ51 (PVP Certificate No. 8600132) and PHV78 (PVP Certificate No. 8800003). PHN46 is earlier in maturity compared to PHZ51. PHN46 silks approximately 50 (1520 versus 1570) growing degree units earlier than PHZ51 (Exhibit C). The leaves of PHN46 are lighter in color (medium green versus dark green), have more marginal waves (few versus none), and have more longitudinal creases (few versus absent) than PHZ51. The anther color of PHN46 is pink compared to yellow for PHZ51. PHN46 has a lighter fresh husk color (light green versus dark green) and a more upright ear shank (upright versus pendant) than PHZ51.

PHN46 is earlier in maturity compared to PHV78. PHN46 silks approximately 90 (1520 versus 1610) growing degree units earlier than PHV78 (Exhibit C). PHN46 leaves are lighter color (medium green versus dark green) and have more marginal waves (few versus none) than PHV78. PHN46 has pink anthers whereas PHV78 has red. PHN46 has green silk color (versus red) and light green fresh husk color (versus dark green) compared to PHV78.

VARIETY DESCRIPTION INFORMATION

INBRED = PHN46

Type: Dent Region Best Adapted: Northcentral

A. Maturity: Average across maturity zones. Zone : 0

Heat Unit Shed: 1510
Heat Unit Silk: 1520
No. Reps: 40

$$\text{HEAT UNITS} = \frac{[\text{Max.Temp. } (\leq 86°\text{F.}) + \text{Min. Temp } (\geq 50°\text{F.})]^*}{2} - 50$$

* If maximum is greater than 86 degrees fahrenheit, then 86 is used and if minimum is less than 50, then 50 is used. Heat units accumulated daily and can not be less than 0.

B. Plant Characteristics:

Plant height (to tassel tip): 198 cm
Length of top ear internode: 12 cm
Number of ears per stalk: Slight Two-ear Tendency
Ear height (to base of top ear): 77 cm
Number of tillers: None
Cytoplasm type: Normal

C. Leaf:

Color: (WF9) Medium Green
Angle from Stalk: 30-60 degrees
Marginal Waves: (WF9) Few
Number of Leaves (mature plants): 18
Sheath Pubescence: (W22) Light
Longitudinal Creases: (OH56A) Few
Length (Ear node leaf): 65 cm
Width (widest point, ear node leaf): 10 cm

D. Tassel:

Number lateral branches: 4
Branch Angle from central spike: > 45 degrees
Pollen Shed: Heavy based on Pollen Yield Test
(107% of experiement means)
Peduncle Length (top leaf to basal branches): 20 cm
Anther Color: Pink
Glume Color: Green

E. Ear (Husked Ear Data Except When Stated Otherwise):

Length: 15 cm
Weight: 103 gm
Mid-point Diameter: 44 mm
Silk Color: Green
Husk Extension (Harvest stage): Long (8-10 cm)
Husk Leaf: Short (< 8 cm)
Taper of Ear: Slight
Position of Shank (dry husks): Upright
Kernel Rows: Straight, Distinct Number = 14
Husk Color (fresh): Light Green
Husk Color (dry): Buff
Shank Length: 13 cm
Shank (No. of internodes): 8

F. Kernel (Dried):

Size (from ear mid-point)
Length: 10 mm
Width: 8 mm
Thick: 4 mm
Shape Grade (% rounds): < 20 (16% medium round based on Parent Test Data)
Pericarp Color: Colorless
Aleurone Color: Homozygous Yellow
Endosperm Color: Yellow
Endosperm Type: Normal Starch
Gm Wt/100 Seeds (unsized): 33 gm

G. Cob:

Diameter at mid-point: 24 mm
Strength: Strong
Color: Red

H. Diseases:

Corn Lethal Necrosis (MCMV=Maize Chlorotic Mottle Virus and MDMV=Maize Dwarf Mosaic Virus): Intermediate
Maize Dwarf Mosaic Complex (MDMV & MCDV=Maize Dwarf Virus): Intermediate
Anthracnose Stalk Rot (C. graminicola): Intermediate
S. Leaf Blight (B. maydis): Intermediate
N. Leaf Blight (E. turcicum): Intermediate
Eye Spot (K. zeae): Intermediate
Gray Leaf Spot (C. zeae): Susceptible
Stewart's Wilt (E. stewartii): Resistant
Goss's Wilt (C. nebraskense): Highly Resistant
Common Smut (U. maydis): Highly Resistant
Head Smut (S. reiliana): Resistant
Fusarium Ear Mold (F. moniliforme): Resistant

I. Insects:

European Corn Borer-1 Leaf Damage (Pre-flowering): Susceptible
European Corn Borer-2 (Post-flowering): Intermediate

The above descriptions are based on a scale of 1-9, 1 being highly susceptible, 9 being highly resistant.

S (Susceptible): Would generally represent a score of 1-3.
I (Intermediate): Would generally represent a score of 4-5.
R (Resistant): Would generally represent a score of 6-7.
H (Highly Resistant): Would generally represent a score of 8-9. Highly resistant does not imply the inbred is immune.

J. Variety Most Closely Resembling:

Character	Inbred
Maturity	PHZ51
Usage	PHV78

PHZ51 (PVP Certificate No. 8600132) and PHV78 (PVP Certificate No. 8800003) are Pioneer Hi-Bred International, Inc. proprietary inbreds.

Data for Items B, C, D, E, F, and G is based primarily on a maximum of two reps from Johnston, Iowa grown in 1989, plus description information from the maintaining station.

CLARIFICATION OF DATA IN EXHIBITS C AND D

Please note the data presented in Exhibit C, "Objective Description of Variety," is data collected primarily at Johnston, Iowa plus description information from the maintaining station. The data in Exhibit D, "Additional Description of Variety," is data from comparisons of inbreds or hybrids grown in the same tests in the adapted growing area of PHN46.

DEFINITIONS

In the description and examples, a number of terms are used herein. In order to provide a clear and consistent understanding of the specification and claims, including the scope to be given such terms, the following definitions are provided:

BAR PLT = BARREN PLANTS. This is the percent of plants per plot that were not barren (lack ears).

BRT STK = BRITTLE STALKS. This is a measure of the stalk breakage near the time of pollination, and is an indication of whether a hybrid or inbred would snap or break near the time of flowering under severe winds. Data are presented as percentage of plants that did not snap.

BU ACR = YIELD (BUSHELS/ACRE). Actual yield of the grain at harvest adjusted to 15.5% moisture. ABS is in absolute terms and % MN is percent of the mean for the experiments in which the hybrid or inbred was grown.

DRP EAR = DROPPED EARS. This is a measure of the number of dropped ears per plot and represents the percentage of plants that did not drop ears prior to harvest.

EAR HT = EAR HEIGHT. The ear height is a measure from the ground to the top developed ear node attachment and is measured in centimeters.

EST CNT = EARLY STAND COUNT. This is a measure of the stand establishment in the spring and represents the number of plants that emerge on a per plot basis for the hybrid or inbred.

GDU SHD = GDU TO SHED. The number of growing degree units (GDUs) or heat units required for an inbred line or hybrid to have approximately 50 percent of the plants shedding pollen and is measured from the time of planting. Growing degree units are calculated by the Barger Method, where the heat units for a 24-hour period are:

$$GDU = \frac{(\text{Max. temp.} + \text{Min. temp.})}{2} - 50$$

The highest maximum temperature used is 86°F and the lowest minimum temperature used is 50°F. For each inbred or hybrid it takes a certain number of GDUs to reach various stages of plant development.

GDU SLK = GDU TO SILK. The number of growing degree units required for an inbred line or hybrid to have approximately 50 percent of the plants with silk emergence from time of planting. Growing degree units are calculated by the Barger Method as given in GDU SHD definition.

GRN QUL = QUAL. = GRAIN QUALITY. This is a 1 to 9 rating for the general quality of the shelled grain as it is harvested based on such factors as the color of the harvested grain, any mold on the grain, and any cracked grain. High scores indicate good grain quality and low scores indicate poor grain quality.

MST = HARVEST MOISTURE. The moisture is the actual percentage moisture of the grain at harvest.

PLT HT = PLANT HEIGHT. This is a measure of the height of the plant from the ground to the tip of the tassel in centimeters.

RT LDG = ROOT LODGING. Root lodging is the percentage of plants that do not root lodge; plants that lean from the vertical axis at an approximately 30° angle or greater would be counted as root lodged.

SDG VGR = SEEDLING VIGOR. This is the visual rating (1 to 9) of the amount of vegetative growth after emergence at the seedling stage (approximately five leaves). A higher score indicates better vigor and a low score indicates poorer vigor.

STA GRN = STAY GREEN. Stay green is the measure of plant health near the time of black layer formation (physiological maturity). A high score indicates better late-season plant health.

STK LDG = STALK LODGING. This is the percentage of plants that did not stalk lodge (stalk breakage) as measured by either natural lodging or pushing the stalks and determining the percentage of plants that break below the ear.

TST WT = TEST WEIGHT UNADJUSTED. The measure of weight of the grain in pounds for a given volume (bushel).

14D. EXHIBIT D. ADDITIONAL DESCRIPTION OF PHN46. INBRED PER SÉ YIELD TEST COMPARISON OF PHN46 AND PHV78 EVALUATED OVER THREE YEARS.

VARIETY #1 - PHN46 INBRED
VARIETY #2 - PHV78 INBRED

* = 10% SIG + = 5% SIG # = 1% SIG

YEAR	VAR #	BU ACR ABS	BU ACR %MN	MST ABS	BAR PLT ABS	PLT HT ABS	EAR HT ABS	SDG VGR ABS	EST CNT ABS	DRP EAR ABS	GDU SHD ABS	GDU SLK ABS	TST WTA ABS	GRN APP ABS	STA GRN ABS	STK LDG ABS	RT LDG ABS	BRT STK ABS
88	1				100.0	190.5	71.1	6.1	36.9		1536	1556			3.3			
	2				93.2	234.4	78.0	5.1	32.8		1597	1665			6.7			
	LOCS				2	3	3	8	12		14	14			3			
	PROB				.205	.059*	.015+	.227	.005#		.001#	.000#			.063*			
89	1	64.8	140	29.5	95.7	177.3	70.1	6.1	33.1		1446	1455	49.3		2.3			100.0
	2	40.5	88	31.9	76.2	210.8	76.2	4.6	26.6		1527	1556	47.8		3.7			100.0
	LOCS	1	1	1	1	6	5	12	19		27	23	1		3			1
	PROB					.008#	.654	.023+	.001#		.000#	.000#			.423			
90	1	58.3	119	18.6	95.8	195.6	67.8	5.1	26.0	100.0	1519	1538	54.6	4.8	4.5	79.6	100.0	92.9
	2	40.0	80	21.6	89.9	226.3	77.0	3.3	20.5	99.6	1622	1675	53.0	4.5	5.9	95.7	98.7	100.0
	LOCS	3	3	3	5	8	8	14	23	3	17	17	3	3	7	3	3	1
	PROB	.001#	.013+	.165	.211	.000#	.031+	.000#	.001#	.423	.000#	.000#	.141	.423	.004#	.055*	.423	
TOTAL SUM	1	59.9	124	21.3	96.8	188.2	69.1	5.7	30.9	100.0	1489	1507	53.3	4.8	3.7	79.6	100.0	96.4
	2	40.1	82	24.2	89.0	222.2	77.0	4.2	25.4	99.6	1572	1622	51.7	4.5	5.6	95.7	98.7	100.0
	LOCS	4	4	4	8	17	16	34	54	3	58	54	4	3	13	3	3	2
	DIFF	19.8	42	2.9	7.8	34.0	7.9	1.5	5.5	0.4	82	115	1.6	0.3	1.8	16.1	1.3	3.6
	PROB	.001#	.003#	.064*	.032+	.000#	.073*	.000#	.000#	.423	.000#	.000#	.047+	.423	.001#	.055*	.423	.500

YEAR	VAR #	BU ACR ABS	BU ACR %MN	MST ABS	BAR PLT ABS	PLT HT ABS	EAR HT ABS	SDG VGR ABS	EST CNT ABS	DRP EAR ABS	GDU SHD ABS	GDU SLK ABS	TST WTA ABS	GRN APP ABS	STA GRN ABS	STK LDG ABS	RT LDG ABS	BRT STK ABS

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14D. EXHIBIT D. ADDITIONAL DESCRIPTION OF PHN46. INBRED PER SÉ YIELD TEST COMPARISON OF PHN46 AND PHZ51 EVALUATED OVER THREE YEARS.

VARIETY #1 - PHN46 INBRED
VARIETY #2 - PHZ51 INBRED

* = 10% SIG + = 5% SIG # = 1% SIG

YEAR	VAR #	BU ACR ABS	BU ACR %MN	MST ABS	BAR PLT ABS	PLT HT ABS	EAR HT ABS	SDG VGR ABS	EST CNT ABS	DRP EAR ABS	GDU SHD ABS	GDU SLK ABS	TST WTA ABS	GRN APP ABS	STA GRN ABS	STK LDG ABS	RT LDG ABS	BRT STK ABS
88	1				100.0	190.5	71.1	6.1	26.8		1543	1557			4.5			
	2				79.5	218.4	78.0	5.4	29.5		1505	1572			4.5			
	LOCS				2	3	3	9	11		13	13			4			
	PROB				.421	.053*	.802	.050*	.119		.009#	.352			.000#			
89	1					181.1	72.4	6.0	30.9		1425	1452			4.8		40.9	
	2					204.7	69.3	5.3	31.1		1429	1467			4.4		90.9	
	LOCS					5	4	12	20		22	22			3		1	
	PROB					.009#	.527	.095*	.737		.728	.116			.808			
90	1	58.3	119	18.6	96.5	191.0	66.5	4.9	26.4	100.0	1479	1501	54.6	4.8	5.4	77.0	100.0	90.2
	2	53.0	106	20.5	93.8	217.2	80.0	3.9	26.0	99.5	1488	1523	57.5	6.1	5.6	84.7	99.8	98.5
	LOCS	3	3	3	6	10	10	18	29	3	25	23	3	3	9	7	4	2
	PROB	.152	.158	.005#	.277	.000#	.000#	.024+	.712	.423	.303	.006#	.005#	.079*	.768	.487	.391	.089*
TOTAL SUM	1	58.3	119	18.6	97.4	188.2	68.8	5.5	27.9	100.0	1473	1495	54.6	4.8	5.0	77.0	88.2	90.2
	2	53.0	106	20.5	90.2	213.9	77.0	4.7	28.4	99.5	1470	1513	57.5	6.1	5.1	84.7	98.0	98.5
	LOCS	3	3	3	8	18	17	39	60	3	60	58	3	3	16	7	5	2
	DIFF	5.3	13	1.9	7.1	25.7	8.2	0.9	0.4	0.5	3	18	2.8	1.2	0.1	7.7	9.8	8.3
	PROB	.152	.158	.005#	.156	.000#	.064*	.001#	.462	.423	.565	.002#	.005#	.079*	.910	.487	.382	.089*

YEAR	VAR #	BU ACR ABS	BU ACR %MN	MST ABS	BAR PLT ABS	PLT HT ABS	EAR HT ABS	SDG VGR ABS	EST CNT ABS	DRP EAR ABS	GDU SHD ABS	GDU SLK ABS	TST WTA ABS	GRN APP ABS	STA GRN ABS	STK LDG ABS	RT LDG ABS	BRT STK ABS

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14D. EXHIBIT D. ADDITIONAL DESCRIPTION OF PHN46.
INBRED PER SE YIELD TEST COMPARISON OF PHN46 AND PHP60 EVALUATED OVER TWO YEARS.

VARIETY #1 - PHN46
VARIETY #2 - PHP60

* = 10% SIG + = 5% SIG # = 1% SIG

YEAR	VAR #	BU ACR ABS	BU ACR %MN	MST ABS	BAR PLT ABS	PLT HT ABS	EAR HT ABS	SDG VGR ABS	EST CNT ABS	DRP EAR ABS	GDU SHD ABS	GDU SLK ABS	TST WTA ABS	GRN QUL ABS	STA GRN ABS	STK LDG ABS
88	1	60.5	104	17.6	100.0	166.4	59.7	5.8	38.0	100.0	1559	1588	54.4	7.3	3.1	76.1
	2	19.8	32	28.9	52.3	196.8	72.4	3.3	36.9	100.0	1695	1781	55.4	5.0	8.0	99.1
	LOCS	2	2	2	2	3	3	4	7	1	8	7	2	2	5	1
	PROB	.280	.307	.310	.433	.147	.300	.127	.510		.000#	.001#	.563	.070*	.004#	
89	1				91.3	180.1	66.0	6.3	27.8		1459	1460			2.0	
	2				90.5	186.7	83.8	3.5	24.7		1582	1607			5.5	
	LOCS				1	4	3	7	8		13	12			4	
	PROB					.340	.250	.000#	.041+		.000#	.000#			.012+	
TOTAL SUM	1	60.5	104	17.6	97.1	174.2	63.0	6.1	32.6	100.0	1497	1507	54.4	7.3	2.6	76.1
	2	19.8	32	28.9	65.0	191.0	78.2	3.4	30.4	100.0	1625	1671	55.4	5.0	6.9	99.1
	LOCS	2	2	2	3	7	6	11	15	1	21	19	2	2	9	1
	DIFF	40.7	71	11.3	32.1	16.8	15.2	2.7	2.2	0.0	128	164	1.0	2.3	4.3	23.0
	PROB	.280	.307	.310	.360	.069*	.067*	.000#	.044+		.000#	.000#	.563	.070*	.000#	

YEAR	VAR #	BU ACR ABS	BU ACR %MN	MST ABS	BAR PLT ABS	PLT HT ABS	EAR HT ABS	SDG VGR ABS	EST CNT ABS	DRP EAR ABS	GDU SHD ABS	GDU SLK ABS	TST WTA ABS	GRN QUL ABS	STA GRN ABS	STK LDG ABS

14D. EXHIBT D. ADDITIONAL DESCRIPTION OF PHN46. COMPARISON OF PHN46 AND PHV78 CROSSED TO THE SAME INBRED LINE AND THE HYBRIDS EVALUATED OVER TWO YEARS.

VARIETY #1 - PHN46 HYBRID
VARIETY #2 - PHV78 HYBRID

* = 10% SIG + = 5% SIG # = 1% SIG

YEAR	VAR #	BU ACR ABS	BU ACR %MN	MST ABS	PLT HT ABS	EAR HT ABS	SDG VGR ABS	EST CNT ABS	DRP EAR ABS	GDU SHD ABS	TST WTA ABS	GRN APP ABS	STA GRN ABS	STK LDG ABS	RT LDG ABS	BRT STK ABS
89	1	158.7	104	21.0	276.6	129.3	6.3	59.2	99.7	1343	56.6	5.6	6.4	92.1	97.4	96.7
	2	158.1	103	22.7	292.6	128.0	6.3	57.0	99.4	1372	56.5	5.5	6.2	91.4	90.5	98.9
	LOCS	47	47	47	19	19	23	33	21	14	47	31	20	41	14	1
	PROB	.808	.616	.000#	.000#	.566	.619	.009#	.275	.002#	.405	.617	.347	.612	.181	
90	1	156.6	103	20.8	257.6	113.8	7.0	60.2	99.9	1435	56.7	7.1	6.2	95.0	98.3	81.9
	2	151.4	99	21.7	271.5	115.1	6.1	56.0	99.9	1456	56.2	6.9	5.6	94.2	95.2	94.4
	LOCS	231	231	232	120	120	118	165	107	55	231	134	134	221	59	17
	PROB	.000#	.000#	.000#	.000#	.063*	.000#	.000#	.862	.000#	.000#	.008#	.000#	.086*	.008#	.008#
TOTAL SUM	1	157.0	103	20.9	260.1	115.8	6.8	60.0	99.9	1416	56.7	6.8	6.2	94.5	98.1	82.8
	2	152.5	100	21.9	274.3	116.8	6.2	56.2	99.8	1439	56.2	6.6	5.7	93.8	94.3	94.7
	LOCS	278	278	279	139	139	141	198	128	69	278	165	154	262	73	18
	DIFF	4.5	3	1.0	14.2	1.0	0.7	3.8	0.0	23	0.5	0.2	0.6	0.7	3.8	11.9
	PROB	.000#	.000#	.000#	.000#	.162	.000#	.000#	.482	.000#	.000#	.011+	.000#	.078*	.004#	.008#

YEAR	VAR #	BU ACR ABS	BU ACR %MN	MST ABS	PLT HT ABS	EAR HT ABS	SDG VGR ABS	EST CNT ABS	DRP EAR ABS	GDU SHD ABS	TST WTA ABS	GRN APP ABS	STA GRN ABS	STK LDG ABS	RT LDG ABS	BRT STK ABS

14D. EXHIBIT D. ADDITIONAL DESCRIPTION OF PHN46. COMPARISON OF PHN46 AND PHZ51 CROSSED TO THE SAME INBRED LINE AND THE HYBRIDS EVALUATED OVER THREE YEARS.

VARIETY #1 - PHN46 HYBRID
VARIETY #2 - PHZ51 HYBRID

* = 10% SIG + = 5% SIG # = 1% SIG

YEAR	VAR #	BU ACR ABS	BU ACR %MN	MST ABS	BAR PLT ABS	PLT HT ABS	EAR HT ABS	SDG VGR ABS	EST CNT ABS	DRP EAR ABS	GDU SHD ABS	TST WTA ABS	GRN APP ABS	STA GRN ABS	STK LDG ABS	RT LDG ABS	BRT STK ABS
88	1	107.5	125	22.2	87.2	224.8	97.3	5.9	60.5	100.0	1315	560	6.0	5.8	97.5	100.0	
	2	91.9	105	21.8	78.6	234.4	97.3	4.9	63.9	100.0	1280	562	6.2	5.3	99.1	97.6	
	LOCS	5	5	5	2	2	2	4	4	1	1	5	5	2	5	1	
	PROB	.070*	.108	.637	.362	.605	.000#	.041+	.131			.696	.374	.500	.057*		
89	1	157.9	105	20.9		271.5	124.5	6.6	57.9	100.0	1356	569	5.3	6.1	91.6	96.6	96.7
	2	149.6	100	19.8		281.9	124.0	5.9	56.0	98.9	1346	577	6.4	5.2	91.6	96.7	98.9
	LOCS	28	28	28		13	13	10	19	13	9	28	28	9	24	15	1
	PROB	.010+	.034+	.000#		.004#	.902	.096*	.031+	.022+	.193	.000#	.001#	.203	.995	.980	
90	1	152.0	104	21.4		256.3	109.7	6.7	59.2	99.8	1454	566	6.6	6.3	95.1	97.6	98.4
	2	144.1	98	20.6		266.4	112.3	5.7	56.6	99.8	1428	574	7.3	5.6	96.5	98.8	98.9
	LOCS	102	102	102		55	55	58	73	47	35	100	77	65	94	17	4
	PROB	.000#	.000#	.000#		.000#	.028+	.000#	.000#	.971	.000#	.000#	.000#	.000#	.001#	.236	.609
TOTAL SUM	1	151.5	105	21.3	87.2	258.3	112.0	6.6	59.0	99.9	1431	56.6	6.2	6.3	94.5	97.2	98.1
	2	143.3	99	20.5	78.6	268.5	114.0	5.7	56.8	99.6	1408	57.4	7.0	5.6	95.6	97.8	98.9
	LOCS	135	135	135	2	70	70	72	96	61	45	133	110	76	123	33	5
	DIFF	8.2	6	0.9	8.6	10.2	2.0	0.9	2.2	0.2	23	0.8	0.8	0.7	1.1	0.5	0.9
	PROB	.000#	.000#	.000#	.362	.000#	.060*	.000#	.000#	.098*	.000#	.000#	.000#	.000#	.010+	.576	.338

YEAR	VAR #	BU ACR ABS	BU ACR %MN	MST ABS	BAR PLT ABS	PLT HT ABS	EAR HT ABS	SDG VGR ABS	EST CNT ABS	DRP EAR ABS	GDU SHD ABS	TST WTA ABS	GRN APP ABS	STA GRN ABS	STK LDG ABS	RT LDG ABS	BRT STK ABS

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14D. EXHIBIT D. ADDITIONAL DESCRIPTION OF PHN46.
COMPARISON OF PHN46 AND PHG29 CROSSED TO THE SAME INBRED LINE AND THE HYBRIDS EVALUATED OVER TWO YEARS.

VARIETY #1 - PHN46 HYBRID
VARIETY #2 - PHG29 HYBRID

* = 10% SIG + = 5% SIG # = 1% SIG

YEAR	VAR #	BU ACR ABS	BU ACR %MN	MST ABS	BAR PLT ABS	PLT HT ABS	EAR HT ABS	SDG VGR ABS	EST CNT ABS	DRP EAR ABS	GDU SHD ABS	GDU SLK ABS	TST WTA ABS	GRN QUL ABS	STA GRN ABS	STK LDG ABS	RT LDG ABS	BRT STK ABS
88	1	117.5	113	20.8	93.5	220.7	101.1	5.8	57.9	100.0	1414	1490	57.3	6.6	5.9	95.8	100.0	
	2	99.7	95	19.2	94.4	202.4	95.5	6.1	60.8	99.6	1364	1370	57.0	5.8	4.1	91.1	100.0	
	LOCS	19	19	19	6	9	9	8	15	12	8	1	19	19	14	16	5	
	PROB	.000#	.000#	.000#	.755	.000#	.001#	.673	.033+	.104	.001#		.130	.080*	.000#	.037+	1.00	
89	1	148.0	102	20.2	98.3	296.4	128.8	6.5	61.2	99.0	1341	1328	57.0	5.9	6.0	94.2	95.8	97.7
	2	140.3	97	19.0	98.3	285.2	123.2	5.8	62.7	98.6	1281	1297	57.7	6.1	4.5	91.4	96.5	98.7
	LOCS	109	109	111	19	51	51	67	77	86	36	8	109	75	50	95	62	12
	PROB	.000#	.000#	.000#	.973	.000#	.000#	.000#	.000#	.006#	.000#	.057*	.000#	.328	.000#	.000#	.148	.193
TOTAL SUM	1	143.5	104	20.3	97.2	285.0	124.7	6.4	60.7	99.1	1354	1346	57.0	6.1	5.9	94.4	96.1	97.7
	2	134.2	97	19.0	97.4	272.8	119.1	5.8	62.4	98.7	1296	1305	57.6	6.0	4.4	91.3	96.8	98.7
	LOCS	128	128	130	25	60	60	75	92	98	44	9	128	94	64	111	67	12
	DIFF	9.2	7	1.3	0.2	12.2	5.6	0.6	1.8	0.5	58	41	0.5	0.0	1.5	3.1	0.6	1.0
	PROB	.000#	.000#	.000#	.783	.000#	.000#	.000#	.000#	.002#	.000#	.030+	.000#	.797	.000#	.000#	.148	.193

YEAR	VAR #	BU ACR ABS	BU ACR %MN	MST ABS	BAR PLT ABS	PLT HT ABS	EAR HT ABS	SDG VGR ABS	EST CNT ABS	DRP EAR ABS	GDU SHD ABS	GDU SLK ABS	TST WTA ABS	GRN QUL ABS	STA GRN ABS	STK LDG ABS	RT LDG ABS	BRT STK ABS

14D. EXHIBIT D. ADDITIONAL DESCRIPTION OF PHN46.
COMPARISON OF PHN46 AND PHP02 CROSSED TO THE SAME INBRED LINE AND THE HYBRIDS EVALUATED OVER TWO YEARS.

VARIETY #1 - PHN46 HYBRID
VARIETY #2 - PHP02 HYBRID

* = 10% SIG + = 5% SIG # = 1% SIG

YEAR	VAR #	BU ACR ABS	BU ACR %MN	MST ABS	BAR PLT ABS	PLT HT ABS	EAR HT ABS	SDG VGR ABS	EST CNT ABS	DRP EAR ABS	GDU SHD ABS	GDU SLK ABS	TST WTA ABS	GRN QUL ABS	STA GRN ABS	STK LDG ABS	RT LDG ABS	BRT STK ABS
88	1	117.5	113	20.8	93.5	220.7	101.1	5.8	57.9	100.0	1414	1490	57.3	6.6	5.9	95.8	100.0	
	2	103.6	98	19.8	93.3	196.8	89.4	6.5	57.4	99.5	1346	1320	55.7	6.3	4.4	97.0	99.2	
	LOCS	19	19	19	6	9	9	8	15	12	8	1	19	19	14	16	5	
	PROB	.002#	.002#	.001#	.894	.000#	.000#	.400	.614	.058*	.001#		.000#	.423	.000#	.496	.093*	
89	1	152.6	104	20.0	98.1	294.1	131.3	6.4	59.2	98.8	1340	1331	56.6	6.1	6.0	94.6	96.6	95.6
	2	146.3	99	19.1	98.1	280.4	121.9	5.9	56.9	98.2	1255	1273	56.5	6.0	4.8	94.7	95.5	97.5
	LOCS	245	245	247	23	98	98	118	149	175	73	10	245	168	115	214	115	15
	PROB	.000#	.000#	.000#	.985	.000#	.000#	.000#	.000#	.000#	.000#	.012+	.503	.350	.000#	.877	.152	.428
TOTAL SUM	1	150.1	104	20.1	97.2	287.8	128.8	6.4	59.1	98.9	1347	1346	56.6	6.2	5.9	94.7	96.7	95.6
	2	143.3	99	19.2	97.1	273.3	119.1	6.0	56.9	98.2	1264	1277	56.4	6.1	4.7	94.8	95.7	97.5
	LOCS	264	264	266	29	107	107	126	164	187	81	11	264	187	129	230	120	15
	DIFF	6.8	5	0.9	0.0	14.5	9.7	0.4	2.2	0.6	83	69	0.2	0.1	1.2	0.1	1.1	2.0
	PROB	.000#	.000#	.000#	.942	.000#	.000#	.000#	.000#	.000#	.000#	.006#	.032+	.243	.000#	.728	.139	.428

YEAR	VAR #	BU ACR ABS	BU ACR %MN	MST ABS	BAR PLT ABS	PLT HT ABS	EAR HT ABS	SDG VGR ABS	EST CNT ABS	DRP EAR ABS	GDU SHD ABS	GDU SLK ABS	TST WTA ABS	GRN QUL ABS	STA GRN ABS	STK LDG ABS	RT LDG ABS	BRT STK ABS

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14E. EXHIBIT E. Statement of the Basis of Applicant's Ownership

Pioneer Hi-Bred International, Inc., Des Moines, Iowa, is the employer of the plant breeders involved in the development and evaluation of PHN46. Pioneer Hi-Bred International, Inc. has the sole rights and ownership of PHN46.